5.7 Which of the following is correct regarding the neuromuscular blockers (NMBs)?

A. Nondepolarizing NMBs are administered orally.
B. Cholinesterase inhibitors reduce the effects of nondepolarizing NMBs.
C. Nondepolarizing NMBs affect diaphragm muscles first.
D. Effects of depolarizing neuromuscular blockers can be reversed using cholinesterase inhibitors.

Correct answer = B. Nondepolarizing NMBs such as cisatracurium and vecuronium are highly polar compounds and are poorly absorbed from the GI tract. Therefore, they are administered parenterally, not orally. Nondepolarizing NMBs are competitive antagonists at nicotinic receptors. Therefore, increasing the levels of ACh at the neuromuscular junction reduces the effects of these agents. Cholinesterase inhibitors increase the levels of ACh at the neuromuscular junction and reduce the effects of nondepolarizing NMBs, but may enhance (not reverse) the effects of depolarizing NMBs. Nondepolarizing NMBs first affect rapidly contracting muscles seen in the face and eyes and affect the diaphragm muscles last.

5.8 Which of the following is correct regarding drug interactions with nondepolarizing neuromuscular blockers (NMBs)?

A. Desflurane reduces the effects of nondepolarizing NMBs.
B. Cholinesterase inhibitors increase the effects of nondepolarizing NMBs.
C. Aminoglycosides increase the effects of nondepolarizing NMBs.
D. Calcium channel blockers reduce the effects of nondepolarizing NMBs.

Correct answer = C. Halogenated hydrocarbon anesthetics such as desflurane enhance the effects of nondepolarizing NMBs by exerting a stabilization effect at the neuromuscular junction (NMJ). Acetylcholinesterase inhibitors increase the levels of ACh at the NMJ and reduce the effects of nondepolarizing NMBs. Aminoglycoside antibiotics increase the effects of nondepolarizing NMBs by reducing the release of ACh from the cholinergic neurons. Calcium channel blockers increase the effects of nondepolarizing NMBs, possibly by affecting ion transport at the NMJ.

5.9 A patient was administered a neuromuscular blocker (NMB) prior to a surgical procedure to produce skeletal muscle paralysis. This NMB drug affected small, rapidly contracting muscles of the face and eyes first and diaphragm muscles last. The effect of this drug was easily reversed with neostigmine. Which of the following neuromuscular blockers was most likely administered to this patient?

A. Rocuronium.
B. Succinylcholine.
C. Diazepam.
D. Tubocurarine.

Correct answer = A. There are two types of NMBs: depolarizing and nondepolarizing NMBs. Depolarizing NMBs are agonists at the nicotinic receptors, whereas nondepolarizing NMBs are antagonists at the nicotinic receptors. Both types of NMBs affect the rapidly contracting muscles (face, eye, etc.) first and diaphragm muscles last. However, cholinesterase inhibitors such as neostigmine increase ACh levels in the NMJ and reverse the effects of nondepolarizing NMBs, but not those of depolarizing NMBs. Therefore, the NMB administered to this patient is most probably rocuronium, which is a nondepolarizing NMB. Tubocurarine is also a nondepolarizing NMB, but it is not used in practice. Succinylcholine is a depolarizing NMB, and diazepam is a benzodiazepine that does not cause paralysis of skeletal muscles.

5.10 A patient was administered a neuromuscular blocker (NMB) prior to a surgical procedure to produce skeletal muscle paralysis. This NMB drug caused initial skeletal muscle fasciculations before the onset of paralysis. The effect of this drug could not be reversed with neostigmine. Which of the following neuromuscular blockers was most likely administered to this patient?

A. Cisatracurium.
B. Succinylcholine.
C. Diazepam.
D. Tubocurarine.

Correct answer = B. Depolarizing NMBs cause muscle fasciculations before causing paralysis, and their effects cannot be reversed using cholinesterase inhibitors such as neostigmine. Nondepolarizing NMBs do not cause muscle fasciculations, and their effects can be reversed using cholinesterase inhibitors. Therefore, the NMB used in this patient is succinylcholine, which is a depolarizing NMB. Cisatracurium and tubocurarine are nondepolarizing NMBs, and diazepam does not cause paralysis of skeletal muscles.